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Russell W. Davenport

Eng 78.1

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Francis Rawle,

through the Harvard

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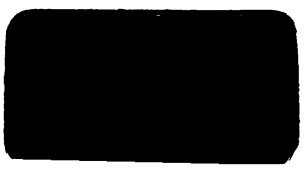

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May, 1906.

Russell Wheeler Davenport

From a photograph by Alman, New York

Russell Wheeler Davenport

(Master of Arts)

Father of Rowing at Yale; Maker of Guns and Armor Plate Used by the United States Government

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Live unto the dignity of thy nature, and leave it not disputable at last, whether thou hast been a man.—Sir Thomas Browne.

G. P. Putnam's Sons
New York and London
The Knickerbocker Press
1905

Eng 78.1

Francis Parkman,
Founder of the
Harvard Graduates' Magazine.

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The Knickerbocker Press, New York

THE larger part of what has been here collected concerning Russell W. Davenport has been taken from communications received from his family, friends, and associates in college and in business.

Mr. Davenport was not a public man, but as his accomplishments in certain directions enabled him to render eminent public service, this brief biographical sketch should be of general interest, although naturally of particular interest only to those who knew him or who know about his work.

In college Davenport's personal character exercised a distinct influence for good among his fellows. He was the foremost oarsman of his day. As a metallurgist he rendered conspicuous service in so advancing the art of steel-making in the United States that this country became able to manufacture without foreign aid cannon and armor plate not surpassed in quality by similar products made anywhere. He produced the forgings for the first six-inch all-steel built-up gun made in the

United States, having participated from the beginning in the studies which rendered this achievement possible. His metallurgical skill found concrete expression in the offensive and defensive equipment of the vessels of the United States Navy that fought in the Spanish War; and in the last year of his life he began the reorganization of the shipyard in which many if not most of those vessels were constructed.

The Editor regrets that the exactions of other duties left him but little consecutive time for his task — a task that should have been given to some one more competent and less occupied with other matters.

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Russell Wheeler Davenport

I

ANCESTRY

Mr. James Bryce in a recent paper, written after revisiting the United States, comments on the increased relative importance in the modern world, not only in this country but in Europe, of the man of affairs, the financier, merchant, manufacturer, as compared with the landowner, the professional man, the man of letters. He points out that, with an extraordinary material development, industry, commerce, and finance "have more and more come to overshadow and dwarf all other interests"; and he notes that whereas in England young men looking forward to a business career seldom go first to the universities, in this country university training is regarded as a valuable preparation for other than professional or literary activities.

It is undoubtedly true that industrial development, which is almost synonymous with applied science, is changing the conditions under which we live so fundamentally and so swiftly that thinkers who do not take account of its forceful progress have no longer a vital relation to their own time. We must all therefore more or less assent when Mr. Bryce adopts the phrase "Business is King."

Those who best knew Russell W. Davenport feel that his life exhibited an admirable example of thoroughly trained activity in applied science and industrial progress—for he had the training of preliminary study, as well as that of the laboratory and the shop. They know that his character made his life-work dignified as well as useful. They remember his charming personal qualities; and in making contribution to a slight record of his too brief career, they are paying him a respect that would be his due as a man, if it were not affectionately offered in memory of a friend.

If, in viewing the life of a man in the full current of the nineteenth century, we find that he was entirely of his time in respect to his ability to meet its needs, but quite untouched by its vices, we cannot but wish to know something of his antecedents.

Davenport was descended from a founder of one of the group of States that became, later, the nucleus, and are now, individually, integral parts of a great and powerful nation. Such a descent, if it can also be affirmed that more immediate ancestors have been men of mark and usefulness, would seem to be sufficiently honorable, without reference to earlier ancestry; but Mr. A. B. Davenport, in a book[1] published in 1876, has traced the descent of John Davenport, a founder of New Haven Colony, through his father, Henry Davenport, Sheriff of Coventry in 1602, to Ormus de Dauneporte, born in 1086, who appears to have taken his surname from the township of Davenport—hundred of Northwich, county of Cheshire—about twenty-five miles from the old city of Chester, with its mediæval walls, and "Rows" of second-story shops, so well known to American tourists.

In 1166 Richard de Dauneporte, son of Ormus, was granted the Chief Forestership, and some fifty years later, Vivian de Davenporte the Grand Sergeancy, of the forests of Leek and Macclesfield, with "acquittance of juris of County and Hundred" —an office held in turn by his son Roger, and

[1] *A Supplement to the History and Genealogy of the Davenport Family in England and America from A. D. 1086 to 1850*, by Amzi Benedict Davenport. Printed for the Family, Stamford, Conn.

grandson, Sir Thomas. They were charged with keeping the peace, and given, in certain cases, plenary powers, even to the taking of life without delay or appeal. They bore the cost of the Sergeancy with the maintenance of assistants while within the county; but across the Dee or out of the county service was at the expense of the King. On the other hand, they received fees—two shillings and a salmon for a master robber, and twelve pence each for less eminent thieves. The crest of the Davenports is supposed to have been adopted at this time: "On a wreath a felon's head, couped at the neck proper, haltered Or."

Eighth in descent from Sir Thomas we have Edward Davenport of Coventry, pewterer, City Chamberlain in 1534, Sheriff in 1540, and Mayor in 1550. Edward's son, Henry, was made Sheriff of Coventry in 1602, and Mayor in 1613. His son, John, the spiritual leader of the settlers at Quinnipiac, was baptized in the Church of the Holy Trinity, in Coventry, Warwickshire. The entry in the record of baptisms, under the year 1597, runs: "Apr. 9, John Dampard Son of Henrie." There is no doubt about the identity of John Dampard with John Davenport, a scholar of the Free School of Coventry, taught by Dr. Philemon

Holland, an inspiring teacher, who imparted his enthusiasm for classical learning to his pupil.

John Davenport went to Oxford in 1613 in company with a kinsman, Christopher Davenport. The exact relationship of these two has not been determined; it has been surmised that they were brothers, also that Christopher was nephew to John, although, according to Mr. A. B. Davenport, he was born in 1598. Christopher had an interesting career. He became a Franciscan, studied at the University of Salamanca, was a Professor of Sacred Theology at Douay, and as Father Francis de St. Clare, a chaplain to Henrietta Maria, wife of Charles I. He was also a reputed friend of Archbishop Laud. A decade after the death of John, the Puritan, Christopher died in a King's palace, having rounded out to fourscore years a life full of honors and ease. The two boys entered Oxford together, as "battlers," or free partakers of tuition and of the cook's commons. While Christopher managed to stay a little longer, John, after two years, was denied his privileges and forced to leave. He became a preacher, first at Hilton Castle, at the age of nineteen, and not long after in London where in 1619 he was Curate at the Church of St. Laurence Jewry. In 1624 he was

elected vicar of St. Stephen's, Coleman Street; November 7th of the same year he read in this church the Thirty-nine Articles, and "declared his full and unfeigned assent and consent thereunto, in the tyme of Morning Prayer, next after the Second Lesson, before the whole Congregacion." It was only after many years, in which he had honestly tried to conform, that John Davenport became a Non-conformist, being at last impelled to "withdraw" because of "doubts about the lawfullness of that conformity which I had formerly used, without scruple, in respect of some defects and corruptions and unwarrantable human impositions, whereby I found myself thereby subjected."

In the year of plague, 1625, the Vicar of St. Stephen's stood manfully by his flock. A minute on the Parish Records may still be read: "That Mr. Davenport shall have of the parish funds in respect of his care and pains taken in time of the visitation of sickness, as a gratuity, the sum of £20." The signal for leaving St. Stephen's, and England as well, was the death, in 1633, of George Abbot, Archbishop of Canterbury, and the advancement of Laud to the primacy. Davenport had belonged to the Puritan party within the Church, and he was not in Laud's favor. The story goes

that long after Davenport's settlement in New England, Laud said of him, "my arm shall reach him even there."

John Davenport fled to Holland, but returned privately to England for a short time before sailing for America. While still in charge of St. Stephen's, in 1629, he had contributed £50 towards the costs of obtaining from the King the charter of "The Governor and Company of Massachusetts Bay"; and we know that he and two other London clergymen had talked with John Cotton, and apparently with Thomas Hooker, meaning to persuade Cotton and Hooker to remain within the fold of conformity. The result of this conference, however, was that Davenport, instead of reclaiming his brethren, had his own allegiance to the old Church most rudely shaken. He could not remain in England, except for a brief visit, as Laud was looking for him; moreover, he was no longer at home in the Established Church. "A poor Pilgrim, a banished man," he sailed early in 1637 for New England, with the colony of which Theophilus Eaton was the secular leader. Nine months after reaching Boston, the destination of their ship, the colony made the settlement at Quinnipiac. Davenport and Eaton, and Hooker with his settlement

at Hartford, were the founders of the State of Connecticut.

The regicides, Goffe and Whalley, after their departure from Boston, were received by the minister of the New Haven settlement, and concealed for a month or more in his own house. In the matter of protecting the judges, Mr. Davenport behaved with great courage and resolution, taking upon himself a dangerous responsibility from which others shrank, and undoubtedly saving the lives of these two men who were of the court that condemned a King, and who yet died in peace in a colony under the crown of that King's son.

A school system for the colony was established by Davenport and Eaton, and, in 1654, Davenport brought forward a plan for a college at New Haven; his removal to Boston prevented the carrying out of this design, and the endowment raised for the college accrued to the Hopkins Grammar School. Nevertheless, Davenport's interest in education—the Indians called him "Sobig-study-man"—made its impression on the colonists, and Yale College found a natural home in New Haven. Called Aaron and Moses of New Haven Colony, Eaton died first, in 1658, and Davenport in 1670; he was buried in the tomb of

the Rev. John Cotton. Dr. John Cotton Mather wrote his epitaph:

JOHANNES DAVENPORTUS
IN PORTUM DELATUS,
VIVUS, NOV-ANGLIÆ ET ECCLESIÆ ORNAMENTUM;
MORTUUS, UTRIUSQUE TRISTE DESIDERIUM.

John Davenport left one son, of the same name, born probably during his father's residence in London. He did not go to America with his parents, but remained in England, under the care of Lady Vere, the same who, in the time of the Commonwealth, had charge of the Dukes of York and Gloucester and of the Princess Elizabeth. In 1639, he made the voyage to America in one of the first ships to anchor in New Haven harbor; later he removed to Boston with his father, and died there in 1677. A third John, son of the last named, after being graduated at Harvard College, became a minister; and assumed the pastorate of a church in Stamford, Conn., where on a tabular monument in the burying-ground is found this inscription[1]:

The Rev. John Davenport departed this life on the

[1] *Connecticut Historical Collections*, by John Warner Barber, New Haven. Preface dated 1837.

5th February, A.D. 1730–1, and in the 36th year of his ministry.

At honorary distance keep,
nor dare disturb the peaceful sleep
of Reverend DAVENPORT.
None but [ARMS] his sons,
the sacred tribes;
or those whom
heavenly Wisdom
guides
may to his URN
resort.

Religion, while he dwelt below,
Its sacred influence on him shed;
Learning and Grace adorned his brow,
And round their balmy odors spread.
Unfading honors shall his tomb surround,
To guard and watch the Prophet's sleeping clay,
Till the last trumpet raise him from the ground
To join the triumphs of th' important Day.

The Hon. Abraham Davenport, son of the John of the above epitaph, was born in 1715, and was graduated at Yale College in 1732. He lived in Stamford, where, as a young man, he immediately made his mark. As a Selectman, member of the Legislature, Clerk of the House, Senator, Judge of Probate and of the County Court, and deacon

of his church for thirty years, he served his township, State, and country to the end of his life, and died as he had lived. Chief Justice of the Court of Common Pleas, he was "struck with death" while on the bench; but he continued to try the case in hand, charged the jury, noted a point in the testimony that had escaped counsel for both sides, and shortly after the court rose was found dead in his bed. It was he who, when a motion to adjourn was made in the Connecticut House of Representatives on the celebrated dark day, May 19, 1780, because of fear that the Day of Judgment was at hand, answered, "I am against an adjournment. The Day of Judgment is either approaching, or it is not. If it is not there is no cause for an adjournment; if it is, I choose to be found doing my duty. I wish therefore that candles may be brought." This incident is narrated in verse in Whittier's "Tent on the Beach."

Through the trying times of the American Revolution, Abraham Davenport, becoming Colonel Davenport, was the man of his neighborhood most to be depended upon for courage, vigor, and wise counsel. He was of the little group of the strong who never faltered until the independence of the colonies was assured. In 1776, he assisted in the

organization of the Continental Army. Later his house was a hospital for sick soldiers, and when bread was at famine prices he sold his corn to the poor at the old and usual price, buying more corn to sell as he had sold his own.

A portrait of Abraham Davenport shows a face resolute to the verge of obstinacy—the fiber of the same manhood that led colonists into a wilderness and harbored the regicide judges.

The Hon. John Davenport, of Stamford, son of Abraham, was no less a patriot than his father. Born in 1752, he was graduated from Yale in 1770. He did good service, as a commissioner appointed by the Assembly, in arousing the people of Connecticut to a sense of duty at a time when interest in the prosecution of the war was waning. Elected to Congress in 1799, he served punctually and laboriously in the House of Representatives for eighteen years.

John Alfred Davenport, next of the line, was born in 1783, and also graduated from Yale. He was an honest merchant and a man of piety. His second son, James Radcliffe, the father of Russell Wheeler Davenport, was born in Stamford in 1812, entering Columbia College in his fourteenth year, and Yale, as a Sophomore, two years later. Gradu-

ated in 1830 with high honors, he was ordained in 1836 to the Presbyterian Church; but in 1847 became an Episcopal clergyman. His first charge after admission to Orders was Grace Church, Albany. In 1857 he accepted a call to St. Anne's, Annapolis, where he remained during the Civil War—stanch in his loyalty to the Union in a society of opposite sympathies. He married Mehetabel Newell, who died in 1904, at the great age of ninety-two. This lady, the mother of Russell W. Davenport, was a granddaughter of Col. Daniel Whiting, who served in the French and Indian wars, fought on the patriot side at Lexington and Bunker Hill, and remained an officer of the Revolutionary Army until the end of the war. Mrs. Davenport, during her husband's rectorship of St. Anne's, was conspicuous in Annapolis for her devotion to the care of sick and wounded soldiers. She had fine tastes, and bore great sorrows with extraordinary fortitude. Her oldest son, John Alfred, died in 1890, in the prime of life; and at the point of reaping the fruits of unusual abilities. This blow was followed by the death of her husband in 1896; and of her youngest child, Russell Wheeler Davenport, in 1904, shortly before her own release, which came the same year.

II

CHILDHOOD

RUSSELL WHEELER DAVENPORT was born November 26, 1849. His father wrote on this occasion,—"A fine boy, born this morning, who promises to be great enough to be a Bishop." The child's god-father was the Rev. Dr. Gregory of St. Paul's Church, Syracuse, and his god-mother, Mrs. Schermerhorn of Albany. As early as 1855 his mother writes,—"Russell has been my earnest little scholar, and desires knowledge in every form." In 1856 his parents took their seven-year-old boy to Santa Cruz—a voyage of sixteen days—and the next year saw the family settled in Annapolis. At this time his mother writes,—"His power of mind, whenever it is taxed, is now greater than has been shown by the other children, and his bodily strength never seems to flag when his mind is interested."

At the outbreak of the Civil War Russell was twelve years old. The town of Annapolis sympathized strongly with the South, notwithstanding

the fact that it was the seat of the United States Naval Academy; feeling ran high; people had to declare themselves. The little Northern lad asked a midshipman how he stood. The cadet, to see what would come, said he was a Secessionist. "Then I would be the first to hang you," said Russell. He had already torn down a Confederate flag hung out near his school; and when Annapolis, expecting a rebel raid, was preparing for defense, he worked in the trenches until the sun was too much for him.

At this time he went to Mrs. Bachelor's School, afterwards for a short time to the Hopkins Grammar School, in New Haven, as a Davenport should, then to Mr. Gibson's School at Burlington, N. J., standing first in a form of seventy-three. Naturally he was eager to enter the Naval Academy, but he could not get an appointment. Later he had the satisfaction of making big guns and armor for the ships he might have commanded, if the matter of the appointment had turned out differently.

The family went to Europe in 1865; and that Russell still had war in his mind is evident from his journal and letters, which are much occupied with the armaments and defenses of the countries visited. In the summer of the same year he entered Mon-

sieur Reichel's School at Lausanne, with the particular purpose of learning French. In two months he was writing letters in that tongue, and at the end of a year his rank was second in a school of seventy-odd pupils. It was a hard and distasteful time, but he went through it without letting discontent get into his letters. Insufficient water for hand-basins, let alone for baths, and gruel-like soup in which pancakes floated, were special grievances. After a year in another school at Darmstadt, for the learning of German, he came home and passed his examinations for the Sheffield Scientific School at Yale, entering as a Freshman in 1868.

III

AT YALE

NEARLY forty years ago the Sheffield Scientific School, as a department of what is now Yale University, was more loosely connected with the Academic Department than it is at present. If the legal relationship was the same as now, in all other respects the School was less an integral part of Yale than it came to be later. The Academic Department looked a little askance at "Sheff," and the relationship between the two was not entirely cordial.

The School had a three years' course; the College a course of four years. "Sheff" men roomed in boarding-houses; Academic students in the College dormitories. The societies in the School admitted Freshmen, who remained in one society until they were graduated. In the Academic Department a man joined a new society every year, if he was fortunate enough to be chosen. The circle gradually narrowed; any Freshman could join a society; almost any one could find a place in

the Sophomore year. The Junior societies took only picked men; and to be a member of a Senior society, especially of the oldest, was the crown of a college career. Only members of the Academic Department were eligible for the crew, base-ball nine, and other college teams. The athletics of the Scientific School were distinct from those of the College, except when a Scientific crew met the Varsity or class crews in a general regatta. It is true that Scientific students used the gymnasium and the boat-house, but as they were not eligible for the Varsity teams they could not feel in complete union with the College. All this tended to make a special life for students of the School, which was not exactly the life of Yale as remembered by men graduated from the Academic Department in the sixties and early seventies.

The somewhat separate existence of the Scientific School was not without its advantages. At that time this department was still in the hands of the little group of men who first took charge of its fortunes, and whose intelligence and honesty of purpose established its character and determined its future. These men thoroughly believed in their work; they were zealous for the honor of their department, and they were most hospitable in their

reception of any undergraduate showing an aptitude for study. The classes were small; and it was possible for picked men to come into personal relations of the most agreeable and stimulating character with the professors—collectively called the Governing Board,—meeting them at odd times through the day, and often in the evening, as well as in the hours fixed for recitations, lectures, or laboratory work. The intercourse between well-mannered, hard-working students and the faculty was so easy, cordial, and sometimes almost intimate, that there was very little occasion for rules or discipline; and the Scientific student of the better sort was in the way of being a good deal more of a man and less of a boy than his contemporary at the other end of College Street.

This was the place to which Davenport came, fresh from his schooling abroad. He was tall, broad at the shoulders, blonde, and handsome. His bow was of a kind not often seen in New Haven —heels together, and a bend from the waist, something a little more formal and finished than was customary in the New-England town. He had a manner as well as manners. He may not have ceased to be a boy at this time, but he was certainly a gentleman. As he had not a particle of

affectation, and was entirely modest, although his real education was considerably more advanced than was the case with most of the young men about him, he escaped even the good-natured "running" which is usually the penalty among students for any peculiarity. He was recognized at once as of a superior sort, but none the less a good fellow. Every one liked him on a first meeting; and the longer he was known the greater the liking.

In 1868, X——, which was the oldest of the secret societies in "Sheff"—having been founded by the same group of men who, with the aid of Mr. Sheffield's liberality, created the School,—was beginning to feel the competition of other societies, and naturally was sharply on the lookout for good material. Davenport was met, appreciated, and elected without delay. His connection with X—— early in his Freshman year brought him immediately into contact of the closest kind with men of all classes; with graduates acting as instructors; and, informally, with many of the Governing Board.

Davenport had a number of relatives living in the town, most of them of founder's stock; all doors were therefore open to him, which meant not a little in those days, because the recognized so-

ciety was that of the College set. The standards of living were simple; the income of an industrious scholar was sufficient to enable him to live in a good house, and maintain his family so that they felt at ease among their neighbors. There was little formal entertaining, but much running in for meals, evening visiting, and foregathering in small parties for talk, music, cards, or dancing. There was boating; and there were croquet parties and skating. Tennis had not yet appeared. Bicycles there were, of wood, for rink riding; a few miles on the road with a bicycle of the sixties broke the stoutest heart. Davenport became as popular in the town as in the School.

By the time another generation has come to the fore, the years of a college course do not seem so crowded with events as they did in undergraduate days; yet certain experiences, peculiar to an individual or to a group, may still be remembered so vividly that there is danger of making too much of them.

There was a "Red Letter Club," organized in '66, by four men of the Academic Department, and one of the Scientific School. Davenport became a member in his second year, filling the place of an original Academic member, who dropped out on

account of leaving College. In 1869 the Club was composed of three men from the oldest Senior Academic society, and two from X——, the two departments, the Academic and the Scientific, coming together in this instance on even terms, in a way that was unusual until a good deal later. The Club—membership limited to five—met on Saturday nights at eight o'clock precisely, in a small room, occupying a corner between the tap-room and the kitchen, of a little ale-house in Crown Street, which was kept by a most reputable Scotch woman, called, by the Club, "Madam Grunert." The room had a corner fire-place; and above an open grate, which certainly came from Scotland, a corner cup-board where Tobies were kept. The furniture was limited to a table and a half-dozen chairs; the sole decoration was a large lithograph of Napoleon with "prone brow," deep eyes, one lock over the forehead, coat thrown back, showing the star of an order.

The rules of the Club fixed the cost of the supper at twenty-five cents for each man, except at the last meeting of the term, when there was a migration to a parlor upstairs, furnished entirely with things brought from Scotland, including a spinet. At these meetings the ordinary fare of Welsh-

rabbit and old ale was supplemented by an oyster or beef-steak pie, sherry, and nuts. At the beginning of each term there were elected a Master of Ceremonies, who ruled with great austerity, and a Scribe. The Master assigned at each meeting the tasks for the next meeting, two weeks later, imposed and collected fines,—seconded by a posse of all members except the delinquent,—and presided. The Scribe had the custody of papers, and kept the records and the bag. Any infraction of a rule was punished by a fine of one dollar; dollars not being abundant in those days, and mercy never shown, the rules were generally observed. The assigned tasks for each meeting were as follows: number one read something worth while from a prose writer; number two a selected poem; number three told a story; number four read a fanciful composition of his own; and number five a history, prepared by himself, of the members and of college events for the two weeks since the last meeting or for the inter-term period.

Every meeting of the Club was a red letter night, not alone because of the quality of the members —the house contributed to the cheer. Madam Grunert compelled respect for her vocation. Her house was no vulgar tavern, where any kind of

drink could be had by any kind of man. Her customers were her clients—mostly members of the Burns Society, which met in her upper parlor. Regular comers had their regular places in the taproom; favorites found their way to the kitchen, which was strictly clean and orderly, as was the rest of the house, although there was nothing new in it. While Madam Grunert drew the ale, her daughter, and sole assistant, made Welsh-rabbits of extraordinary excellence in the kitchen. After the serious work of the evening was over, a venturesome member would sometimes open the door between the kitchen and the Club's room to see the making of the rabbits; and occasionally to have a wee bit claver with a favored member of the Burns Society, settled by the fire, who later might be induced to recite or to dance a fling. There may be somewhere even now a place like Madam Grunert's; but a present-day searcher for the impression it conveyed would probably save time by going to the works of Charles Dickens.

There is often as much education in process in little circles of the sort just described as in the classroom. It is not unlikely that occasionally more time is given to preparation for a club night than for the classes of a day or two. As for the dis-

cipline of the Club, it was pitiless; to be three minutes late or to write on other than regulation paper meant a fine of a dollar. The Red Letter Club had its influence, no doubt, in shaping the man who many years later was so acceptable to the officers of the United States Army and Navy that many delicate negotiations between the great steel works at Bethlehem, represented by Davenport in his maturer years, and the Bureaus of Ordnance could be intrusted to him only.

Many of Davenport's college friends have given their testimony as to the estimation in which he was held by fellow-students. Although it is impracticable, without undue repetition, to print in full letters that often cover the same ground, the material furnished is most valuable in tracing the development of his character and showing his preparation for life.

He who, without in any sense seeking favor, is popular among men has generally a title to be esteemed as well as liked. In examining the letters from Davenport's old friends, we find that expressions of affection or regard are always accompanied by some reference to the finer qualities of manhood. His acquaintance was not so wide as it might have been if he had been less careful in the

disposal of his time; but men who knew him only slightly spoke of him as "Davvy," and there always seemed to be in this nickname an implication of good-will and a suggestion of participation in something valuable to the undergraduate community. More definite evidences of popularity are not lacking. He was for more than one term the President of one of the secret societies; he was a member of the Committee on the Regatta Ball, held on the evening of July 12, 1871—the year of his graduation,—which function, then one of Yale's most important social events, he did not attend, because he was also one of the historians of his class; and the class supper, at which the histories were read, came off the same evening. He was on the Thanksgiving Jubilee Committee in the autumn of '71, and one of the Marshals of the procession to the church when President Porter was inaugurated, October 11th of the same year, as well as one of the Committee of Six in charge of the torch-light procession in the evening. At college, and as long as he lived, Davenport was guiltless of anything offensive in manner or of any undignified self-assertion. He met people courteously and pleasantly, and never said disagreeable things; he had an even temper, and was a man

who, correct in life himself, did not find it necessary to point out or grieve over faults in others.

Perhaps Davenport's most striking characteristic at this time, because most unusual at his age, was a certain concentration of purpose. As a classmate says, he seemed to have his life-work plainly in view, and to have been intent upon preparing for it. Nor did this lead to the too narrow construction often put upon education by the specialist. Notwithstanding the laboratory work and drawing demanded by taking simultaneously two full courses —chemistry and metallurgy, and mechanical engineering,—he gave much time and painstaking attention to English composition. One of his classmates, more than thirty years after the event, writes with enthusiasm about a certain essay on "Glaciers." Indeed, that Davenport's fellows had a high opinion of his abilities is evident from their letters. One who was not an intimate writes,—"I looked upon him as the most intellectual man in the class." Others comment on the evenness of his performance: "He was not brilliant one day and a failure the next; he was always up to the mark." And we find everywhere recognition of the solid qualities of scholarship combined with an alertness that seems to have made a distinct

impression. There is no doubt that Davenport was a good all-round student, far above the average in abilities and industry. Finally we may add that his teachers—with whom he was always a favorite—looked upon him as an able, conscientious, and creditable disciple. In his first year of post-graduate work he was selected to make a chemical investigation concerning some points in the manufacture of malleable iron; the results were published in *The American Journal of Science and Arts.*

It would be easy to fill some pages, from the letters of Davenport's classmates, with admiring comments concerning his character, but we shall only avail ourselves of an anecdote recorded by one of them: "I recall one laughable incident that occurred in the French class: after a deplorable change from the exhilarating influence of Whitney[1] to the lax instruction of another teacher, Davenport, arriving late one morning, took a front seat, and in due course recited; then, probably feeling that the French he had learned abroad was not being materially helped, he rose, and politely asked in French to be excused that he might go and get some breakfast. The Instructor, who was

[1] Professor William D. Whitney.

a Frenchman, with the utmost courtesy, and without the least appreciation of the humor of the situation, at once acquiesced, replying that a man must of course have his breakfast; Davenport bowed himself out."

It is seldom that an undergraduate accomplishes anything in letters or science that has a permanent place in the history of his university; but in these days when athletics have become so important that we may expect the institution of a new degree to be conferred for attainments in physical culture, the names of men mighty with the oar or on the gridiron are more often linked with the glory of their Alma Mater—even in the serene and scholastic atmosphere of alumni meetings—than those of sons who have achieved merely literary or professional distinction. There are many Yale graduates who would be uncertain which of the Justices of the Supreme Court of the United States belong to the University, even if the roster of the Court were read to them: there are very few who would hesitate about claiming Bob Cook or Heffelfinger.

We have seen that Davenport, as a boy, lived near the water; and we know that he belonged to a juvenile boat-club at Annapolis. It was to be expected that at New Haven he should take to

rowing; and, as he had a way of doing rather well anything undertaken, he rowed to such purpose that he has a distinct place in the history of that art as practiced at Yale with somewhat conspicuous success from Davenport's time to the present day. The first crew to which he belonged was captained by Thomas G. Bennett, a man of great physical strength and determination of character. Bennett pulled stroke, and Davenport rowed behind him on the starboard side; this was in the autumn of 1869. In June, 1870, the crew of the Sheffield Scientific School, stroked by the same men, won a race against a crew from the Lawrence Scientific School of Harvard; and a few days later again won in a race open to Yale class crews. The race with the Lawrence Scientific School excited great interest, as it was won from Harvard at a time when Yale was not as commonly fortunate as in years to come. Each member of the winning crew received a silver cup. From October, 1870, to June, 1872, Davenport stroked the Sheffield crew, of which he was captain, and won three races, beating another crew from the Lawrence Scientific School, and the best crew that could be put in a boat by the Academic Department of Yale. It appears that in 1871 the successes of the Scientific School led to

opening the competition for places on the Varsity crew to Sheffield students.

The following is the substance of a letter from one of Davenport's life-long friends, who rowed with him for two or three years.

In the more exacting sports Davenport's high character was pronounced, and made itself felt. He would have nothing but clean sport. As a rowing man, in my opinion, no one then in college was his equal; and I very much wanted to see him stroke of the Varsity crew.

There was a meeting of the boat club, officially presided over by Davenport, to consider the matter of Mr. Southwark's decision as to who were eligible for the Southwark cup. I remember how strikingly Davenport's attitude at that time was judicial, clear headed, and tactful. He strongly advocated taking advantage of the mechanics indicated in the application of sliding seats, then a new thing. They had been introduced into the Yale University shell the previous season by Walter Brown, who was acting as coach. We had little money, and an Elliott boat two years old, which, however, had been well cared for. With the formal approval of the boat club, Davenport and I undertook to see what could be done; and being a little given to applied mechanics, I agreed to build the seats myself, working Saturdays and Sundays at our shops. This was done, and the seats though somewhat crude were very effective. They were the first sliding seats used in any Yale inter-class contest, although the

Varsity boat, as re-arranged with sliding seats by Walter Brown, was in the boat-house, and our opponents could have used it had they so elected.

Davenport's strong personality led many Scientific School men to really believe in our crew, although we ourselves had not an impression that our boat was fast; the one thought particularly urged upon us by Davenport was that we were to do our duty in the race. There were many suggestions about the University to the effect that we had great temerity to enter the contest against so vigorous an opponent as the Sophomore crew of the Class of '73, made up, as it was, of five Varsity oarsmen, and a good oar for the sixth.[1] This was the year when we had our first break with Harvard, who, refusing to row us, and flirting with other colleges, had organized intercollegiate regattas, from which she withdrew after five years of finishing second. Perhaps from pique, Yale did nothing that year for a race with the Cambridge men; and as the months slipped by the Varsity crew was not organized and there was no special training, which explains why the men mentioned as of the Varsity crew were available for the '73 boat.

Our race at Saltonstall was three miles with a turn, and I remember that at the first stroke Davenport pulled himself off his seat. The race was actively contested up to the turn, by which time we were slightly in the lead. We

[1] At that time there were no "eights" and no coxswains; crews were of six men, the bow oar steering the boat by means of a yoke operated by his feet and connected with the rudder by wires.

got about a little quicker than the other boat, and I recollect starting the crew, as bow, before we had quite rounded the stake. There was a rather strong wind at our backs, so we faced more resistance in coming home, which in our boat was overcome by the advantage of the leg drive possible with sliding seats. We crossed the line winners, with a lead of about 48 seconds, much to the dismay of the other department, and as much to the surprise of the men in our shell, and of the friends who had been hardy enough to back us. We were obliged to bring our boats in on flat cars; and Davenport and I found, as often happened, that not only had most of our crew slipped away, but that only a handful of men remained from other crews. We all helped one another in loading the boats, unloading at the "Iron Bridge," and rowing down to the old boat-house. I remember that Davenport, sitting in his seat at stroke, and I in mine at bow, with no one between, towed behind us the empty shell of some other crew.

A gentleman whose name perhaps more than that of any other one man has been associated with rowing at Yale, has spoken of Davenport as having had more advanced ideas on the proper use of the oar than any man of his time. He said in substance:

I very well remember Russell Davenport's crew; it was a remarkable one. Davenport stood high in my estimation, and inspired the respect and confidence of every

under-classman in the University; he was one of the ablest men there—intelligent and progressive, and it stuck out all over him. He had evidently got his ideas of rowing from his own thinking, drawing his conclusions from observation, and perhaps from the study of the subject in English books. He succeeded more than any one else in giving his investigations a practical form; in fact he was a pioneer in rowing and had all the qualities of a pioneer—capability, energy, self-denial, a clear conception of the thing he had taken hold of, and of the principles involved in it. He had the proper stroke up to a certain point, attaining the straight back and the leg drive. At that time none of the Yale oarsmen understood that a proper recovery was what they lacked; nevertheless their rowing was the most advanced of any in the United States. If they had got an easier recovery and brought their slides forward more readily after getting in their leg work, it would have been what we regard as right to-day. Davenport and his crew rowed better than the Varsity or any Yale crew of the time; he had started a new school, and may fairly be called the father of Yale rowing.

Enough has been said to indicate the nature of Davenport's college life; it was studious, clean, and manly, and not one-sided. He was graduated in 1871, reading a thesis on "Hot Blast Applied to Iron Melting." After a year's service as instructor in chemistry in the Sheffield Scientific School, at

the earnest advice of his professional friends he sailed for Europe to study further at the Royal School of Mines, University of Berlin. In the autumn of 1873 he went to Silesia to learn puddling, and was there during an outbreak of cholera. In the early part of 1874, well supplied with letters of introduction, he visited all the most important iron and steel works in England, Wales, France, Austria, Germany, and Belgium.

IV

MIDVALE

WHILE still in New Haven, Davenport had roomed for two years with Charles A. Brinley, at that time a post-graduate student in chemistry and metallurgy. In 1872, Brinley went to the Midvale Steel Works in Philadelphia, as chemist. In the following year he was put in charge of the metallurgical department. In 1874, knowing of Davenport's return to the United States, Brinley suggested him for the position of chemist. The appointment was offered and accepted.

Davenport found his friend living in a workman's house of four rooms. The two on the ground floor had been converted into a laboratory. In one of the upper rooms there was a large water-tank and some lumber. The remaining second-story room was scarcely large enough for a single bed, a wash-stand, a chest of drawers, and a couple of chairs—possibly there was but one chair; if there were two, probably they were not a couple. Between the

house and the Works ran a branch of the Reading Railroad, over which day and night trains of coal cars rattled by on their way from the Falls of the Schuylkill to Port Richmond on the Delaware. A woman of the neighborhood came in to cook; and meals were served in the lower front room, which was nearly filled by a balance and stool, a machine for physical tests, a table, and a broken-backed arm-chair cushioned with an old coat that had belonged to a former chemist who had died of malaria.

Davenport arrived and took half of the single bed and of the towels. Brinley's little Scotch terrier, "Blitz," made his protest against more company by tearing Davenport's hat to shreds, sometime in the first night. It was not long, however, before the three chums were living together as harmoniously as intimately. The days were laborious, but full of interest; and not a night passed without a visit to the furnaces, followed by a round of the Works. There was not much time for social affairs, nor was there a great sense of loss on that account. Now and then a man would turn up toward the end of an evening, the greater part of which had been spent in finding the way to Nicetown. He might be an old acquaintance from New Haven or some unfortunate Philadelphian from below Market

Street, who had been driven to a desperate undertaking by letters asking him to look up the young men at Midvale. People who did call, were so impressed with the singularity of the *ménage* that, in the end, there were a few little parties in the balance-room, at some of which ladies were present; on one occasion there was a clergyman who asked a blessing on the supper. One evening, when there were no ladies, it was only with the greatest difficulty that Davenport, exasperated that the head of a bad little classmate could not be forced into the water pitcher, could be prevented from putting him bodily into the tank in the second story back.

Before a year had run round, Mr. Middleton, the Superintendent of the Works, died of malaria followed by typhoid fever; and Davenport had an attack of malaria, which obliged him to go off for a few weeks to a better air. After Middleton's death, Brinley took his place; and Davenport left the laboratory to take charge of the melting department. These changes put the entire management of the manufacturing into the hands of the two friends, subject, of course, to the orders of the President of the Company, Mr. William Sellers, who, as it happened, very rarely visited the Works, although in constant touch with his lieutenants.

The Midvale Steel Company was founded originally, as the Butcher Steel Works, by William Butcher, an Englishman, who built and for some years operated the Works with the aid of Philadelphia capital. The business was not profitable. In 1872, the plant remained, and some thousands of tons of scrap; but a large sum had been lost in the venture, and the products of the Works were in bad repute. Before Davenport arrived at Midvale, in 1874, progress had been made in the task of establishing order and converting the accumulations of scrap into saleable steel. It still remained to make, and market, better products; and to build up a profitable business.

It should be borne in mind that before the last quarter of the century steel-making in the United States was still conducted mainly by rule-of-thumb methods. Men who had come from class-rooms and laboratories directly to the practical conduct of a manufacture for which they were solely responsible were forced to adopt the scientific method, and stand or fall by it. It was adopted at Midvale. The practical men that remained in the Works objected to methods they did not understand, and they objected to being taught, as they said, by boys; some threw up their jobs; others submitted,

but with grim predictions as to results. The results were the successive placing upon the market by Midvale of various high grades of open-hearth steel that before had only been produced by the crucible process. The force in the Works grew from less than a hundred men in 1872 to some six hundred in 1882.

Such special products as steel for locomotive tires, for car and locomotive axles, for cutting tools, etc., were successfully made by the open-hearth process; and shown at the Centennial Exhibition of 1876, where Midvale also exhibited really solid steel ingots made in the same type of furnace. The first order from the Government to an American manufacturer for gun forgings was given to Midvale by the Chief of the Bureau of Ordnance of the Navy. The forgings were for little howitzers to be used at coast-guard stations to throw a line to ships in distress. The date was March 18, 1875. From this small beginning the gun industry grew steadily at Midvale, and at Midvale alone, with the development of a complete system of experimentation and of records, until, in 1882, forgings were made for parts of guns of six-inch caliber.

To ascertain accurately the facts about the first

six-inch all steel gun built in the United States, reference has been had to the records of the Bureau of Ordnance of the Navy Department. It appears that September 2, 1881, the Bureau sent a circular-letter to fifteen steel works, inviting proposals, and giving particulars concerning solid steel forgings for a rifled cannon. One house in Pittsburgh was willing to undertake the work, but did not in the end do it. Midvale asked time for consideration. The others answered that they were "not prepared." December 2, 1881, Midvale wrote,— "We will agree to make the forgings described in your communication of September 2d"; the letter proceeds to state certain conditions. June 12, 1882, Midvale writes concerning a proposal for parts of six-inch rifled guns. The letter ends,— "We return to you your communication of May 24th, for alterations as agreed upon with the writer during his visit on Saturday last. Please return it as promised with the formal order for the material."

Davenport became Superintendent of the Works in the latter part of July, 1882. His first letter to the Bureau of Ordnance is dated July 21st. There is also a letter from Davenport, of September 19th, which says,—"We are now ready to begin forging on the first of the two six-inch rifled guns for which

we hold orders." It appears, therefore, that the honor of making the forgings for the first six-inch built-up gun belongs to Davenport, who took the matter up precisely at the point where the negotiations had ended and the work began.

Davenport's part in the development of steel-making at Midvale, before as well as after he became solely responsible, was highly important. During his first year, when he acted as chemist, the analytical work, upon which the whole metallurgical system rested, was in his hands. Afterwards, when at the head of the melting department, he gave his fine abilities as a most intelligent and loyal coadjutor to producing the results he had previously checked; and to the production of new results that materially advanced the art of steel-making in this country. It is hardly necessary to say that he was the confidential adviser and partner rather than the subordinate of his friend and housemate, for the two men kept house together until one was married, four years after the partnership at Midvale began.

When Davenport had his attack of malaria, previously mentioned, he was attended by Dr. William Darrach, of Germantown, who not only sent him off in time to prevent a serious illness, but insisted

that the housekeeping in the laboratory should come to an end. He even went so far as personally to find a small house in Germantown, the greater part of which could be rented from a widow who was willing to act as housekeeper. The house was in a good neighborhood, not far from where Dr. Darrach lived. Mr. Francis Rawle, in after years Davenport's closest friend, also lived near by, as did Mr. Guilliaem Aertsen, who was soon to join the force at Midvale. The move was made; each man had a bedroom to himself; there was a comfortable sitting-room and a dining-room; the furnishing was done by the tenants. It was possible now to be hospitable to friends without relying entirely upon curiosity to bring them. There were many pleasant little parties in the bachelor apartment; and no one was so welcome as the kind and genial young doctor whose early death was keenly felt by the men he had so wisely advised, and assisted in many ways to a more reasonable method of living.

Aertsen was often at the house in Queen Lane, where he heard so much of Midvale that he also was drawn into the steel works, to be graduated after an apprenticeship, as a third partner in the group that worked as one to make the most of

the manufacturing end of a business to which all were honestly giving their best energies.

Aertsen was the first of the three to announce his engagement; and it was at a dinner given in Queen Lane to the young and courageous couple, still unmarried, that Davenport proposed the famous toast: "To youth, beauty, and indiscretion." When relatives from New England, the native soil of the tenants, came to Philadelphia, they were not allowed to escape a journey to Germantown, and entertainment, as bachelors understand it.

If the evenings in Queen Lane were pleasant, so were the days at the Works, where the practical issues of manufacturing, sometimes dry in detail, were handled without discouragement under the stimulus of constant advance in the management of a most interesting and capricious material.

Not every night, however, was spent in Queen Lane. There were critical times at the Works. Mistakes were made, accidents happened; sometimes the pots—technically open-hearth melting furnaces—had to be watched the twenty-four hours round. It is indiscreet, with no matter how good a purpose, to dig too large and deep a hole in the cellar of a building, especially if the floods of a violent summer shower have access to the hole.

This was done on one occasion; and no one went home for forty-eight hours, including a Sunday, or until a crib was built and the building safe. To smash the cylinder of a ten-ton hammer at a time when the tool is needed is also a serious matter, barring rest for a night or two.

There was an old rolling-mill at Midvale, which had not been operated under the new dispensation. No one at the Works had any knowledge of rolling-mill practice. The President of the Company contracted to roll the steel bars for the suspended structure of the Brooklyn Bridge, the cables of which were already in place. Angles, I beams, and channels were to be rolled from rectangular steel billets, so far as was known at Midvale, for the first time in the history of what has since become an industry of great proportions. It was necessary, in order to start the mill, to bring into the works at this time nearly a hundred strange men—gathered from anywhere. A certain amount of work had to be turned out daily to escape a serious loss. The new rolling-mill hands thought half this quantity enough; when pressed, they struck to a man, and were paid off. Another lot of men had to be found, and the problem of adequate production again attacked. Meanwhile the cities of New York and

Brooklyn were clamoring for their bridge; and until the bars came through the mill at the required speed it was an anxious time for the chiefs.

The eagerness with which all work was pressed at Midvale in those early days may—with apologies for introducing matter not entirely pertinent—be illustrated by an anecdote. An open-hearth furnace used to last but a few weeks before it became necessary to repair the lining. The head bricklayer at Midvale was a witty old Irishman named Tom. One of the furnaces was out of commission—it was the best of but two—and Davenport, Tom, and others interested were watching impatiently for the interior to cool off enough for the men to go in and get to work. The lining at last no longer showed red, but was at what might be called a blue-heat. Some one in authority, turning to Tom, said,—"Do you think you could get in there now?" The answer was immediate,—"Yes, sor, but I don't think I wud be worth taking out."

We have seen that in the latter part of July, 1882, Davenport was appointed Superintendent of the Midvale Works, where, as chemist, head of the melting department, and Assistant Superintendent he had already had eight years of fruitful experience. He held his new post for six years, discharging all

the duties incident to his position with great credit. In the decade before his administration began, the works had grown from something like a ruin to a successful establishment employing six times as many men as in 1872. From almost the beginning of this period he had participated in most of the work resulting in rehabilitation and progress. He was therefore fully equipped for management, and under his direction Midvale advanced more rapidly than before; its products had the confidence of users, and its head deserved the confidence of all who knew him—of the owners of the Works, of purchasers, and, not least to the honor of the manager, of the men he directed.

Davenport's reputation as a metallurgist will always be peculiarly associated with the making of steel for ordnance and armor. The United States learned to make its own great guns and the armor plating for its men-of-war in the period covered by Davenport's connection with Midvale and Bethlehem. With the metallurgical side of this development Davenport had more to do than any other one man. Between 1875 and 1882 the problem of making suitable steel for guns had been attacked, the methods of investigation outlined, and important results obtained in determining the chemical constitu-

tion of steel and the proper ways of working it in order to insure certain physical characteristics. Although not alone in this labor, a part of it, involving essential details, was Davenport's particular duty. From 1882 until 1888—in which period he had visited most of the important steel works in England and spent some time at the great Creusot works in France, studying appliances for the heavier kinds of forging—Davenport bridged the gap between experiments, with achievements on a small scale, and the complete accomplishment of results that were not surpassed elsewhere.

An article in the *Army and Navy Journal* of April 18, 1885, comments on the advance in the size of pieces forged at Midvale and speaks of the admirable work done there in making tubes for converted guns, field-pieces, six-inch and eight-inch guns for cruisers, and eight-inch breech-loading high power rifles for the Army. The same paper mentions a circular letter sent in 1883 by the Ordnance Bureau of the Army to more than twenty steel makers, inquiring "whether or not gun steel in suitable masses of the requisite quality could be procured in this country" for the manufacture of eight-inch guns. From the replies received the conclusion was reached that forgings for steel guns

of as large caliber as eight-inch could not then be procured in the United States. Two years later the Bureau advertised for the forgings of an eight-inch gun; the only bid received was from the Midvale Steel Company.

United States ordnance officers know that the making of large guns in this country was attended with but few failures and accidents as compared with those that occurred in reaching the same point in England, for instance; and, while attributing the success obtained here chiefly to the rigid requirements of the Bureau's specifications, they do not hesitate to give to Davenport the credit that is his due. Excellent as were their specifications, it is not to be forgotten that for more than ten years there was but one steel works in the United States that would undertake to fill them.

One of the little group of young men gathered at Midvale in 1875—men participating in its management, and then acquiring the habits of mind that have helped them all to later successes—has very pertinently said that in 1888 Davenport's reputation as a metallurgist was so established, in connection with steel for ordnance and kindred products, that when the Bethlehem Iron Company undertook, on a large scale, the manufacture of

steel of this description, they naturally turned to him as the one available man in the country who could bring to their help all the information, experience, and ability needed.

The same friend, who worked with Davenport for eleven years, says,—" No one could appreciate more than I the sweetness of his disposition, the strength of his character, his honesty of purpose, and the mental characteristics which made possible his success in his chosen profession."

Another co-worker writes: " As a manager of men, Mr. Davenport was as successful as in his metallurgical work. Although he was always a rigid disciplinarian, his straightforward truthfulness, tact, kindly disposition, and untiring energy obtained for him the love and respect of all with whom he came in contact."

When the time came to leave Midvale, Davenport broke the connection, doubtless, with some regret upon his own part, assuredly with regret upon the part of those he was leaving. One Saturday night, towards the end of July, 1888, a body of Midvale men, four hundred strong, marched from Wayne Junction to Davenport's house, and presented him, as a token of their esteem, with a handsome gold watch, and charm in the shape of a

miniature of the first six-inch built-up steel gun made in this country. Mr. J. K. Griffeth, Superintendent of the melting department, acted as spokesman. Davenport replied as follows:

"It was fourteen years ago last May, in 1874, that I came into the laboratory at Midvale, a rather fresh and green-looking young man, I fancy, as some of you may remember. The Works had just then passed through a crisis, which had come near being fatal; and life was being brought back under the direction of Mr. Middleton, as Superintendent, and Mr. Brinley, as his assistant in charge of the laboratory and the steel making. The Works had been brought to this low condition by the grossest carelessness, if not ignorance, in the direction of the details of manufacture. Good and willing men were not lacking; the bone and sinew had been there; practical skill in melting, heating, and working steel had been there; and there had only been needed to make the enterprise a success a more accurate chemical knowledge of the difference between good and bad steel, and a common-sense and conscientious application of it in the direction of the work.

"These requirements were well filled by Mr. Middleton and Mr. Brinley; and they took hold of

the work in such a way as to make every true man trust and respect them. It was no easy task; the reputation of the Works for producing good material was absolutely gone. Something like three thousand tons of steel of various kinds, and in various conditions of manufacture, were piled about the yard, regarding which little or nothing was known. The only stock-record book in existence was in the brain of old Mike Kelly, and to him Mr. Brinley would go for information, such as it was. The question of assorting this mass of material and determining its usefulness had to be solved by the laboratory, and it was to help in this work that I came to the Works. By careful selection, and mixing with high-grade pig iron purchased for the purpose, all this old stuff was successfully worked into rail blooms for which we got over $100 a ton (the present selling price of finished rails is below $30). This contract for rail blooms was with the Reading Railroad, and had been nearly cancelled because the former management of the Works had tried to use old ingot moulds in making the steel, and thereby put in so much phosphorus as to cause the rails to break in unloading.

"In the autumn of 1874, a very sad thing happened. Mr. Middleton, run down by overwork

and anxiety, was taken with typhoid fever; and, after a most painful illness, died in November. Mr. Brinley was now made Superintendent, and I went from the laboratory to be his assistant. At this time there were less than seventy-five men employed at the Works. One small open-hearth furnace was in operation; No. 1 hammer ran a few days a week; some tool steel was melted in crucibles and hammered at old No. 3 hammer. Something had to be done to increase the product of the Works. The Pennsylvania Railroad was then purchasing from England axles, rough turned all over, for its passenger service, and paying thirteen and a half cents a pound for them. They were guaranteed to stand a very severe test, and no one made them in this country. The officials of the road scarcely cared to give us an order, but we finally took an order for one hundred axles and went to work. Pete McAnally will remember how carefully we considered the subject, and analyzed a piece of an English axle; how many trial heats we melted, and how anxiously we watched the result of the drop test, shivering in the cold those winter days. Finally we succeeded, and have since made many thousands of these axles for the Pennsylvania road, selling them for several years past

for about four and a half cents a pound, which speaks well, I think, for the ability of our English cousins to charge a big price when they think they can get it, and for the effect of home competition in reducing price, notwithstanding a protective tariff.

"We next turned our attention to tires. As already said, the tire-mill had been shut down; the tires had become so bad that they could not be sold. We believed that a first-rate tire could be made in the open-hearth furnace, and went to work to do it. P. Connor will remember the first open-hearth tire ingot made in this country and sent to the forge to be punched and beaked. He looked at it very suspiciously, but it did not bite him, and it hammered very well. The manufacture of open-hearth tires soon ceased to be an experiment, and the Works have since sold over 125,000 of them. In the meanwhile additional hammers and rolls were put in, and the production of miscellaneous forgings, bit and spring steels, etc., constantly increased. Then came the first call from the army and navy for steel for built-up guns. We grappled with the subject with great doubts of success; the tests demanded were very severe, and our facilities very limited; but

Mr. Brinley's careful scientific mind directed our first efforts, and we obtained promising results from the start. The development of this work has, I think, been a great advantage to the Works, and most instructive to all concerned. Up to the present time no other works in the country has supplied the Government with any large amounts of ordnance material.

"I have referred to a few things which we have accomplished at Midvale during all these pleasant years of work. We might have done more, yet I do not think we need be ashamed of our record; but, my friends, the fact that gives me more pleasure and satisfaction than any I have mentioned is, that during all these fourteen years, first under the direction of Mr. Brinley, and since 1882 under my direction, we have never had a serious disagreement, and work has never been stopped by a strike. And what has been the cause of this most desirable condition of affairs? It is, I think, chiefly because we have been able to trust one another. You have been led by comparatively young men, who brought from school knowledge learned from books and the laboratory. They came among you (and I do not speak now of myself alone, but also of the corps of able assistants with whom I have had

the pleasure of working) not with an overweening sense of the importance of the theoretical knowledge they had acquired, but with a high appreciation of the practical knowledge and skill acquired by you in years of hard work, and with a desire to learn from you and to give what they could in exchange. They have tried, I think, not to take undue advantage of the power accompanying their position, and not to make promises that they could not carry out. They have endeavored to know you personally; to meet you as man to man; to make you trust them, and their efforts have not failed."

V

BETHLEHEM

THE Bethlehem Iron Company, now known as the Bethlehem Steel Company, has a long history, with which the fame of John Fritz is inseparably connected. To two generations of metallurgists and engineers his name and reputation have stood for much that deserved admiration and grateful recognition. He ruled at Bethlehem for so long that it was difficult to separate his identity from that of the works he superintended.

In 1888, Davenport was invited to go to Bethlehem on the understanding that he was shortly to succeed Mr. Fritz as General Superintendent, acting meanwhile as his assistant; the offer was accepted, and the new duties assumed in September of the same year. It is not always, however, that plans as to succession in office are carried out to the letter. Davenport did not become the General Superintendent of the works until 1899; and possibly steel metallurgy and the art of forging gained by the accidents which confined his energies for

some years to a narrower field than that first contemplated.

Davenport saw the rise of Midvale; after fourteen years of service, he could have drawn the plans of its shops from memory; it was his first field of practical endeavor, and for six years before 1888 he had been in command. When the Bethlehem Iron Company, with admirable foresight and courage, made its gigantic preparations for supplying the needs of a new navy, it was at Bethlehem that his opportunity waited; and his going there was a necessary step in the development of his talents and the march of his career. But the transition from an industrial establishment that has grown under one's own hand to another, larger and differently organized, is always a trying experience, demanding an access of energy, infinite care, and tact. We may be sure that Davenport's first years in his new service were difficult; that he had not only to adjust himself to new conditions, but gradually to make others feel the influence of his character and the soundness of his judgment—a double task, which successfully accomplished proved the metal of the man, that is to say, his qualities, aside from mere technical knowledge or skill.

The determination to create a forging plant that would surpass in efficiency any in existence, and to do so without government aid, or any more definite assurance of keeping it occupied than could be found in the signs of the times, was a bold venture of the kind that results in signal success or disastrous failure. To invest millions of private money with a view to a public need, contingent upon the continuance of a policy that may cease to be held with a change of political ascendency, requires the faith and daring of a general who cuts loose from his base and takes hazards that can only be justified by success. The management of the Bethlehem Iron Company was committed to its venture three years before it called upon Davenport. In January, 1886, Bethlehem entered into a contract with Sir Joseph Whitworth & Company for supplying machinery similar to that which the Whitworth people were using for the manufacture of the best forgings then made. The contract further stipulated that the English firm should furnish all information necessary for operating. There was also a provision that skilled men should be sent from Manchester to superintend the erection and starting of the new machinery. It proved unnecessary, however, to call for this assistance;

the Bethlehem people, with the knowledge gathered by the representatives of the Company who had visited the Whitworth establishment, were able to erect and put the plant in operation without further aid. A contract was also made with Schneider & Company of Le Creuzot, France, by which they agreed to furnish necessary drawings of machinery, as well as full information as to manufacturing methods and shop practice, for making steel armor plate; the Creuzot Company, moreover, granting rights to manufacture under all its patents relating to this product as made by them.

The course adopted by the Bethlehem Company to attain its object was, first, to decide, after a careful investigation, where the best practice prevailed; secondly, to pay the necessary price for full knowledge as to the most advanced methods, and for the best appliances, and then to make their own plant more efficient than any other. Bethlehem found the best appliances and methods for making guns and heavy shafts in Manchester, for making ship armor at Creuzot; it bought the experience of Whitworth and of the Schneider Company, and built a plant competent to make heavier forgings than could be produced by either of the foreign establishments. Whitworth used hydraulic

presses for forging guns and shafts, Creuzot a hundred-ton hammer for shaping armor plate: Bethlehem built bigger presses and a bigger hammer. The management of the Bethlehem Iron Company at that time deserves unstinted praise for its program, and for the way in which it was carried out. It is to Davenport's credit that in the execution of Bethlehem's great undertaking he was able to supply metallurgical skill—acquired mostly in this country—which contributed not a little to make the vast preparations described promptly and highly effective. At the critical moment he was, by reason of a long and arduous preparation, the best equipped man. The opportunity came to him as the wages of honest work, and he not only saw his opportunity, but proved equal to its demands.

In 1886, William C. Whitney, then Secretary of the Navy, asked American manufacturers to bid on about thirteen hundred tons of steel forgings for heavy cannon and six thousand seven hundred tons of steel armor plate, the bids to be opened March 22, 1887. The tenders of the Bethlehem Iron Company were accepted for both classes of forgings, and the contracts were signed in May and June, 1887. The first forgings for guns and shafting were produced in the autumn of 1888. As already

noted, Davenport went to Bethlehem in September of that year, about the time the new forging plant was put in operation; he did not, therefore, participate in preparing it, but he immediately became an expert adviser, and assumed larger responsibilities as rapidly as was practicable. In mid-year, 1890, he went to Europe on behalf of the Company, and stayed at Cruezot for several months learning the making of armor plate after Schneider & Company's methods. He and Mr. O. F. Leibert, also of the Bethlehem Company, brought back with them all the information needed; as a consequence, the manufacture of armor plate was highly successful from the first. Davenport did excellent service in devising and putting in motion plans for identifying the various pieces made for the Government throughout the whole course of their manufacture; for proving them, and keeping accurate records of their history from one stage of production to another. He also at this time conducted personally the larger part of his Company's business with the officials of the Government in Washington concerning guns, armor plate, and forgings for engines.

In 1889, Bethlehem was making for the Army sixty guns of calibers from eight to twelve inches,

inclusive; for the Navy, the armor of the barbette battle-ship *Puritan*, the double turretted monitors *Amphitrite*, *Monadnock*, and *Terror*, the battle-ship *Texas*, and the armored cruiser *Maine*. It was also making shafts and heavy forgings for the cruisers *Newark*, *Philadelphia*, and *San Francisco*. Early in the same year Bethlehem finished the largest steel shaft ever made up to that time at any forge; it was 27 feet 10 inches long, 37 inches in diameter at the center, and 34 inches at the ends.

Lieut.-Col. W. Hope, V. C., a distinguished English officer, who, in 1890, when he visited this country, stood in close relation to the British War Office as an advisory expert, having long been recognized as an authority on ordnance, said as he was leaving the United States, after three months given to inspecting American works—"I consider the Bethlehem Gun Plant to be superior to any gun plant in the world."

The first armor plate forged at Bethlehem was made in the summer of 1891. When tested at the Annapolis proving ground it was found superior to a Creuzot plate tried the preceding September. It seems unnecessary to go into further detail about the achievements of the great works on the Lehigh River—which stream, by the way, had its course

deflected for the convenience of the most important tenant of its valley. Enterprise that is typical of American business habits—and a finer example can hardly be cited—was crowned with a complete and striking success.

When it comes to estimating Davenport's share in the development of the forging industry at Bethlehem, in the conduct of the Company's business, and in the advance of scientific metallurgy, it is impossible to be precise without a long investigation for which the material is not at hand; neither would such an enquiry, if its end were to establish definite facts, be of any particular interest or value. A man's work, as his character, is best judged by a consensus of opinion, derived from the estimates of those who have had full opportunities for observing, and who have come to conclusions which, though not necessarily infallible, are, like the findings of juries, as nearly correct as any likely to be obtained. Fortunately we have in the letters written to the President of Harvard University, at the time when it was proposed to recognize Davenport's labors by giving him an honorary degree, explicit records of the estimation in which his accomplishments as a metallurgist and his services to the nation were held by impartial witnesses who

had been in a position to judge, and who possessed the requisite knowledge to appraise with reasonable accuracy. These letters were written by officers of the Army and Navy, with whom Davenport had come in contact when negotiating at Washington or when they were acting as inspectors at the works; by officers of other steel works watching keenly the progress at Midvale and Bethlehem; and by associates who were or had been Davenport's co-workers. Confidential letters cannot, of course, be printed here, nor is there any reason why they should. That they were written is significant of the care exercised before a great university confers an honor; and that the degree was conferred is sufficient as to their testimony.

In 1893, Davenport was appointed Second Vice-President and General Manager of the Bethlehem Company. June 27, 1894, he received from Harvard the degree of A.M., *honoris causa*, "in consideration of his scientific acquirements as a metallurgist in steel; and of his special services to the general government in the manufacture of guns and armor plate at Bethlehem, in which the United States, largely through his labor, has clearly taken the front rank among nations." On the 29th of June, 1898, a few days after he had been made a

director and Superintendent of Manufacture of the Bethlehem Company, Davenport was again honored by receiving the same degree from Yale University; his status in his field of study and service is fixed by the terms of Professor Fisher's address of presentation:

"I have the honor to present to you, for the degree of Master of Arts, Mr. Russell Wheeler Davenport. Having graduated at the Sheffield Scientific School in 1871 and remained for a year as an Instructor in Chemistry, Mr. Davenport spent two years in the School of Mines in Berlin, visiting also various iron works in different countries abroad. In preparation for the work before him he undertook the severest manual labor, in order to learn by actual contact the difficulties to be overcome and the methods to be improved. While connected with the Midvale Steel Works in Philadelphia the forgings were made under his superintendence for the first six-inch, high-power, built-up gun for the United States Navy. In connection with the Bethlehem Iron Company, in the organization and management of which he took an active part, he has had for the last five years the general charge of the forging, gun, and armor-plate business. During his association with this Com-

pany, steel forgings have been produced in America for all the heavier calibers of medium high-power cannon. At the same time the manufacture of forged steel armor plate has been introduced at the Bethlehem works. A distinguished Army officer, in a letter which I have seen, speaking of the qualities and methods of production of steel for guns and armor, says of Mr. Davenport that 'almost unaided he has brought the method of this manufacture to its present high standard and satisfactory condition.' So, essentially, it is owing to his scientific knowledge and metallurgical skill that the guns and shafting made of Bethlehem forgings, and armor plate made at the Bethlehem plant, are now on the United States battle-ships *Iowa* and *Texas*, and on the *Olympia*, *Brooklyn*, and other cruisers. No gun is fired from these ships, no armor plate upon them resists the impact of a cannon ball, which do not owe their strength to the fertile ingenuity and the untiring patience of Mr. Davenport. Several papers from his pen relate to the manufacture of steel forgings. Permit me to remind you that the recipient of this degree is a descendant of John Davenport, the Founder of New Haven."

As to papers from Davenport's pen, it is to

be noted that most men successful in applied science are hampered in writing for the public by the fact that, although their practice may be in advance of common knowledge, they are not at liberty for commercial reasons to publish freely. In 1893, he read a paper on "The Production in the United States of Heavy Steel Engine, Gun, and Armor-Plate Forgings," before the Society of Naval Architects; this paper was printed in the Society's *Transactions*. In March, 1896, Davenport delivered an address to a public audience in the lecture-room of the physical laboratory of Lehigh University on the "Development of Armor and Guns." In 1897 he wrote for the marine number of *Cassier's Magazine* an article on "Steel for Marine Engine Forgings and Shafting." A pamphlet written by Davenport and printed in behalf of the Bethlehem Iron Company, which discussed the price of armor plate and Congressional action touching this matter, was published in June, 1898. In the same year he wrote another article on marine engine forgings and shafting.

It is not necessary to dwell further on Davenport's connection with the Bethlehem Iron Company, which in April, 1899, was merged in the Bethlehem Steel Company, a corporation with a

nominal capital of $5,000,000, although its value was then estimated at $15,000,000, or more. On May 29th of the same year he became the General Superintendent of the new Company, with its five thousand men, acting in that capacity until August, 1901, or shortly after the property, with which he had been identified for thirteen years, passed by purchase into the hands of Mr. Charles M. Schwab, then President of the United States Steel Corporation.

We may, however, introduce here a paragraph touching Davenport's life, aside from his professional work. As long as he remained in Philadelphia, after the bachelor establishment in Queen Lane had been broken up, he was an inmate of the household of Mr. Francis Rawle. Not long after going to Bethlehem he built a pleasant house on the high ground near Lehigh University, and lived there, still as a bachelor, in rather luxurious quarters as compared with those of his early experiences in Philadelphia, until he married, June 1, 1897, Miss Cornelia Whipple Farnum, of Philadelphia. The house on Fountain Hill was enlarged, and Davenport for the residue of his life—a brief seven years —entered into all the satisfactions of a singularly happy marriage. A son was born to him in 1899.

His personal friends know how well he deserved these late honors, and how well he wore them. A second son came too late for a father's care, but not too late for the inheritance of a name the old good repute of which the father had sensibly enhanced. Davenport held political office but once. He was a Presidential Elector for the Lehigh-Berks County District of Pennsylvania, voting in that capacity for McKinley and Roosevelt. On leaving Bethlehem, Davenport, not sorry to renew old associations, brought his family to Philadelphia. He gave two years to rest, study, and travel. He also availed himself of this interval, before again going into harness, to get rid of that little organ—or if not organ, appendix—which of late years has claimed so much attention, and become so important in surgery.

VI

CRAMP'S SHIPYARD

In connection with the United States Navy, Cramp's Shipyard in Philadelphia is probably a more familiar name than Midvale or Bethlehem. The guns and armor made by these companies were for ships many if not most of which were built at the historic works on the Delaware. That in the end Davenport's aid should be sought by the constructors of war vessels seems but a natural and evolutionary step in his career.

In 1902 the affairs of the Wm. Cramp and Sons Ship and Engine Building Company were not in good condition. The time had come when a large sum of money was needed, and it may be assumed that changes in the personnel and methods of management were also necessary. An executive committee of the board of directors of the Company was charged with the task of reorganization. The committee, after a careful search for a man fitted to act for them as technical adviser,

and as their representative at the works, selected Davenport for this important post. The offer was accepted, and June 22, 1903, the "Expert Assistant to the Executive Committee" entered upon his duties.

It had been a question whether Davenport should at once be made the chief executive officer of the Company, or for a time occupy tentatively a position in which he could survey the situation and determine in his own mind what it was possible to accomplish. The latter arrangement was thought to be on the whole the wisest plan; and in this opinion Davenport concurred, if he did not insist that it should prevail. He therefore went to the task before him backed by authority to make a complete examination of the conduct of the works, but without being committed to full responsibility for what might or might not be a possible undertaking.

No one who has not passed through the experience can fully understand how serious a matter it is to reorganize rapidly a great industrial establishment. System of some sort exists of necessity; where system is incomplete, habit serves instead. Men not of high intelligence are always tenacious of a system they have learned and reluctant to use a new one;

habit, as a great man has said, is not second nature, but twelve natures. No system works altogether automatically; the manager is obliged in introducing new methods to make them appear reasonable to the men upon whose co-operation he is dependent. Heads of departments are jealous of authority in their own spheres, and jealous of each other. Discipline in shops is not military discipline. Imagine an army in which any one of the force, or any number, on receipt of a distasteful order, may desert at a moment's notice without let or hindrance! A successful manager has not only to know the technique of his business; he must take account of the individual temperaments of his lieutenants, and of the collective prejudices or preferences of the units of his industrial army. A new manager navigates uncharted waters, not in the open sea, but where shoals abound, necessitating continual soundings: on the other hand, he must at times choose his course at some hazard, and adhere to it with the firmness and courage that fully accepts responsibility. There are good reasons, it is evident, why ability to administer properly the affairs of industry commands high wages. Men competent for the work are rare; they are, in fact, captains, with some difficulties to meet that military men are spared.

Davenport, finding himself again at the head of four or five thousand men—for in a little more than three months (October 2, 1903) he was formally appointed General Manager,—began by making a study of the existing staff, officers and men, and of their duties and pay. He took every opportunity for personal acquaintance, and tactfully led departmental heads to state their views about arriving at greater efficiency and better correlation. In this way he found occasion for estimating the capabilities and characteristics of his men and for learning the detail of the business.

There are certain elements of production common to all manufacturing. However other items of cost are handled, labor and material must always come into the reckoning. Arrangements about labor involve agreement between two parties, of which the wage payer is only one; but the disposition of material is entirely in the hands of the owner. Davenport began promptly, after a preliminary inspection, to arrange for obtaining proper supplies of material by well ordered methods, calling for requisitions, purchase orders, vouchers, and checks upon quality, quantities, and prices. He also used his experience, acquired at Midvale and Bethlehem, in devising means for keeping track of

different kinds or lots of material in separate stages of manufacture. To thoroughly systematize the purchase, receipt, and use of material is in itself a long step towards successful management. To readjust the positions and duties of a staff, and eliminate unnecessary labor, is a more delicate task, and a still more important one. Finally, to inaugurate a system of cost keeping which will give detailed and accurate information, without too much clerical work, and to bring the system into proper relation with the general accounting department, is to complete the mechanism necessary for good results. All these essential reforms were undertaken and prosecuted with untiring energy and considerable success. It is not meant that the management at Cramp's was necessarily bad before Davenport's advent; the fine ships launched from this famous yard imply the contrary; but it not infrequently happens that there comes a time in a business when a readjustment is necessary, and it may be easier for a comparative stranger to see what is needed than for those who have long been wonted to methods well enough at one stage of progress but subsequently outgrown.

Without harmful disturbances or dislocations, such as often accompany sudden changes in the con-

duct of a long established business, Davenport introduced more modern and better methods in almost every branch of the Company's service. He insisted on greater exactness, defined more strictly the duties of each position, and fixed individual responsibility. No change was made, however, before he had carefully considered the probable results, and given a full hearing to the heads of the departments concerned. We have excellent testimony to the effect that in all the discussions and disagreements, such as naturally arise when conflicting views have to be reconciled, his tact and good judgment never failed to bring about final harmony. At the same time the firmness and energy of his character immediately impressed those concerned with the necessity of conforming promptly and in good faith to any determination reached by one whose fairness in deciding disputes, as well as his judgment, was universally respected. It is said by those in a position to speak with knowledge that his administration, short as was its term, effected a permanent change for the better, and it seems fair to assume that the influence of his brief control will make easier the way of his successors.

Davenport undertook, in assuming the management of the Cramp works, a severe labor, demand-

ing great capacity for hard work, but he was at the time in the fulness of mental vigor and in sound health. If it had not been for a dangerous exposure, incurred in the course of duty, which brought on pneumonia, resulting fatally, March 2, 1904, he would probably have soon so perfected his organization that he could have handled his work without overtaxing his strength, for he was not a believer in the need of working continually to the danger line. He held that a man with large responsibilities should not allow his nervous system to be strained beyond the limit of elasticity. Here, as in other respects, he was wise with the wisdom that is based upon a careful weighing of all that bears upon the attainment of results. He deliberately chose the work to which his life was devoted because he believed that for him it offered the best opportunity for usefulness and achievement. To his mind, no occupation was more honorable than manufacturing, if a man held a position in which he could make his authority and influence count for order, the punctual performance of duty, and integrity in all business relations. He preferred to be a producer—assured that in this capacity he could do some of the necessary work of the world.

Great riches quickly made in business usually

result from the qualities of generalship, a genius for estimating chances, for selecting lieutenants, for sifting the essential from masses of detail, and a combination of audacity and prudence in almost equal measure—certain sorts of business, of course, having the advantage of war in the fact that lawyers supply the prudence. Men of business with the qualities of generalship become rich when they work for themselves: they are handicapped as to their accumulations when they lose sight of the Olympic prizes of our day in a conception of service to a corporation which drains their energies for the benefit of the body they represent. Davenport belonged to the latter class; he was, moreover, a student of technology, with a student's absorption in definite problems. His success as a manager was largely due to the confidence inspired by an equable temper, by a mind having the scientific method of basing judgments on ascertained facts, and a habit of saying what he meant, and of keeping faith. As a negotiator, his success, by reason of his ingrained integrity, was naturally greatest in dealing with men of honor. He was not of the strategists of industry, whose sudden riches dazzle the vulgar so that small folk talk in millions with perhaps more relish than the men who now and

then buy a railroad to add to their "systems." He made no great fortune, but he did a lot of good work, not without a reasonable reward honestly earned.

Davenport was a scholar in the metallurgy of steel—no one knew the subject better. With all men he was just and considerate in his dealings; in private life he was a gentleman by virtue of education, innate good taste, and high standards of conduct according to which he lived. Thinking people are not overly proud of some of our conspicuous citizens, but those who knew Russell Davenport as his friends knew him, cannot but feel that the country would be perfectly safe if it produced abundantly men of his caliber and soundness.

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